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The Relationship between Learning Styles of Pre-Service Music Teachers and Academic Achievement *

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Abstract: The present study aims to determine learning styles of students majoring in Music Education Departments in Turkey and thus develop scale on learning styles to be used in piano lessons. Moreover, it is intended to reveal the relationship between students' learning styles identified by the developed scale and their academic performance in piano lessons. In this sense, an achievement test was developed to assess student's performances in piano lessons. The research was figured according to relational screening model among the screening models. The population of the research is composed of 3rd grade students majoring in Music Education Departments in Turkey. The sample of the research consists of 473 third grade students out of 730 3'rd year students studying in Music Education Departments. Developed by the researchers to assess students' performance in piano lesson, the scales titled "Pamukkale Piano Learning Style" and "Piano Performance Test" have been used. In light of the results obtained from the study, a learning style model has been developed to learn piano instrument. According to this model, students' independent, analytical, dependent and emotional learning styles have been identified. According to the research results, there is no high-level relationship between all learning styles and piano academic performance.

Keywords: *Music education, learning styles, piano education.*

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Introduction

Human beings always seek for information every moment of their life. Education therefore has long been an ongoing process. In parallel with the fast-paced of the technology, the concept of technology has been changing and evolving. Since ancient times, "education" has been defined with respect to its own disciplines. Yet, a different sense of education is prevalent today.

"Today's sense of education has led us-educators-to understand learners' personality traits more and to design learning environments according to student learning styles. One of the primary objectives of these studies is to build student learning styles" (Hasirci, 2006, p.16).

Given (cited in Sural, 2008, p.2) articulates "several recent studies have shown that students demonstrate following behaviors when teachers employ students' proffered learning styles as their main mode of teaching."

- Positive attitudes towards learning
- Acceptance of differences
- Increased academic success
- Positive classroom behaviors and discipline
- Individual self-discipline in doing homework

When students' learning styles are determined and teaching proceeds accordingly, the results will be more effective. In this respect, adoption of student-centered approach in education can yield effective results.

Student-centered education put the student at the centre of teaching process. In their study, Lipton, Laura and Hubble and Deborah (cited in Unver, 2002) underline that student-centered approach is an attitude, not a method. It is built on

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students 'questions, reflection, and experimentations as they engage in classroom activities. Student-centered teaching approach exists as an outgrowth of those experiences. In this context, teachers create learning opportunities for their students and themselves.

In student-centered approach, students are at the forefront. Distinctive characteristics of students are also taken into consideration. This is because individuals need to be lifelong learner to improve themselves. Each individual is confronted with different issues and obstacles. Therefore, most students naturally develop various learning experiences. These differences can be divided into two factors: external factors (environmental factors) and internal factors (factors related to learning). Many negative and positive factors affect learning which an internal state is shaped by external factors. Considering plenty of variables affecting learning environment, it is unlikely to expect that traditional instructional practices will effectively impact on students' learning environments. Learning as a mean of effective education can be better realized by viewing students' individual differences and arranging learning environments accordingly (Fer, 2014).

In society, individuals vary from each other in every aspect. Genetic variation and genetic combination from both parents are of vital importance. Hence, students possess different kinds of minds and abilities (Kuzgun & Deryakulu, 2006).

"When learning occurs, such factors as individual differences and intelligence, age, arousal and psychological state and competency and transferring level of prior learning can be a matter of fact." (Aydin, 2014, p.241-242). At this point, the concept of learning becomes more important. More specifically, learning styles play a crucial role in the process of learning.

"The term 'learning style' was first used by Rita Dunn in 1960. (...) Dunn defines learning styles as follows: "The way in which each learner begins to concentrate process and retain new and difficult information. That interaction occurs differently for everyone" (Cited in Boydak, 2014, p.3).

"Most students waste their time with endless repetitions, which yield no gains for their learning process. Considering the total time they spent on repetitions, they may feel good about themselves. Ultimately, they complain about they didn't learn anything and ineffective results. The fundamental problem here is they do not know how they learn (Ertem, 2014, p.10).

"Both students' awareness about their own learning styles and teachers' awareness about their students' learning styles will provide many hints for improving the quality and quantity of approaches designed to accommodate students' learning styles" (Deniz, 2011, p.951).

The concept of 'Learning Styles' have long been studied in the literature. It dwells on how individuals can learn. "The rising psychological aspects of education especially after the second half of the 1900s results in the notion that individuals bear different characteristics and these individual differences should be taken into consideration in educational practices." (Veznedaroglu & Ozgur, 2005, p.1). "Every learning is a new learning. Learning best facilitates with a process that draws on the beliefs and views about a topic that students can test and integrate with new, more refined ideas" (Kolb & Kolb, 2005, p.194). Therefore, bearing in the mind that learning styles should be developed paying attention to students' individual differences, education system can be designed in a way that fits students better, thereby promoting quality of education.

"The understanding of individuals' learning ways plays a key role in improving education. Several studies on education have tried to shed light on the influences of individuals such as definitions of concepts, learning styles and scientific achievement" (Ari, 2008, p.52).

In his study, Sural (2008) asserts that the design of education and training activities in line with the learning styles of the students facilitate accomplishing the goals of education and training. Students who possess different learning styles can help teachers organize in-class training more interactively. Subsequently, more qualified education and high quality learning experience for students can be ensured.

"Mayer points out that students learn most effectively when instructional methods are tailored to their preferred learning style" (Cited in Fer, 2014, p.205).

The present study attempts to seek an answer to the following question: "What kind of learning styles do students enrolled in Music Education possess? Thus, Pamukkale Learning Style Scale was developed and four learning styles were determined. These are named as independent, analytic, dependent and affective learners and are outlined below:

Students who prefer independent learning style are individual learners. They don't need any external factor, a teacher or a friend. Such students can categorize pieces of music they practice, analyze and interpret them from their own point of views. They prefer to learn on their own and exhibit high self-confidence. However, since an individual learner will not benefit from a teacher experience or knowledge, independent learning style can have some drawbacks in terms of students' vocational experience and performance.

Students who prefer analytical learning style adopt a conceptual view. They don't work pieces of music as a whole, divide them into sections. Students try different methods and adopt solution-oriented approach in an effort to reach a solution. They prefer individual learning as well. Such students like to work in safe learning environments and they like to divide their works into smaller parts by analyzing challenges they encounter. They are good at reading musical scores. They can decipher musical notation quickly. Such students learn in a planned way and subsequently learn pieces more systematically and faster. This can be seen as an advantage in students' learning process. Yet, when students work musical pieces as a whole, they can barely finish playing in time and they are delayed due to passage works, which is seen as a disadvantage in terms of analytical learning style.

Students in a dependent learning group wait for an external warning. Guidance of someone else comforts students and makes students work better when they organize their studies. As such students always are looking for other resources; they cannot read the musical notation very well. When they start to decipher a new notation, they first need to hear it from someone else. They often consult their works to be checked by someone else. In the stage of working on a musical piece, they try to reach audiovisual resources and they play them by imitating. A student with dependent learning style has a more artistic and musical character as they access to various resources. On the other hand, they have lower self-confidence as they depend on an external factor and they cannot read the notation very well. They complete a musical piece of work in a longer period.

A student adopting affective learning style looks for a familiar tune in a musical piece. Such students can better work if they like pieces of music they play. If they don't like musical piece, they cannot perform effectively. They mostly prefer to play their pieces over and over in a wholly way. They always expect to take positive feedbacks during piano courses and if they take a negative feedback, they alienate themselves from the course. Such students who play their preferred melodies and pieces can easily learn as they have high levels of motivation. They can be successful when they find suitable conditions for themselves. On the other hand, as they always demand to play their favorite pieces, we cannot expect an efficient and qualified training. Mostly students adopting affective learning style cannot accept their teachers' criticism.

Ultimately, innovative approach of education influence students' learning environments and their learning process. For this reason, if learning styles are determined and education is planned accordingly, then we can expect more efficient results and a better learning experience for students. In this sense, the present study seeks to answer following research question and related subproblems:

What kind of a relationship exists between music teacher candidates' learning styles and their academic achievement in piano lesson with respect to the Piano Learning Style Model?

1. How is the distribution of students' learning styles according to the variables of gender, type of high school graduated, the period of regular piano playing, private piano lesson taken, the period of private piano lesson taken, the number of piano teachers with whom students work together through their course of music education?

2. Do students' independent learning styles differ significantly depend on gender, type of high school graduated, the period of regular piano playing, private piano lesson taken, the period of private piano lesson taken, the number of piano teachers with whom students work together through their course of music education?

3. Do students' analytical learning styles differ significantly depend on gender, type of high school graduated, the period of regular piano playing, private piano lesson taken, the period of private piano lesson taken, the number of piano teachers with whom students work together through their course of music education?

4. Do students' dependent learning styles differ significantly depend on gender, type of high school graduated, the period of regular piano playing, private piano lesson taken, the period of private piano lesson taken, the number of piano teachers with whom students work together through their course of music education?

5. Do students' affective learning styles differ significantly depend on gender, type of high school graduated, the period of regular piano playing, private piano lesson taken, the period of private piano lesson taken, the number of piano teachers with whom students work together through their course of music education?

6. What kind of a relationship does exist between students' learning styles (i.e; independent, analytical, dependent and affective learning styles) and their academic achievements in piano lesson?

Methodology

This section provides information on the research model, the study population and the sample size, the validity and reliability study of data collection tools and a series of tests used for data analysis.

Research Model

In this research, the relational screening model, which is a type of general screening model, was utilized. "The relational survey models are research models which aim to describe a past or present situation, as it exists. In the screening model, the person or the object, which is the research subject, is examined in his/her/its own conditions" (Karasar, 2002, p.77).

In the present study "Pamukkale Piano Learning Style" (2017) and "Piano Achievement Test" (2017) scales have been developed by the researchers to assess students' performance in piano lesson. In light of the results obtained from the study, a learning style model has been developed to learn piano instrument. According to this model, students' independent, analytical, dependent and emotional learning styles have been identified. Additionally the students' identified learning styles have been correlated depend on gender, type of high school graduated, the period of regular piano playing, private piano lesson taken, the period of private piano lesson taken, the number of piano teachers with whom students work together through their course of music education variables.

Study Population and Sample Size

The study population of the research consists of 3rd grade students enrolled in the Music Education Departments across Turkey. Permissions have been obtained from the universities. In the original implementation, Pamukkale Piano Learning Style Scale and Achievement Test for Piano Lesson were delivered to 730 students studying at different universities. 493 out of 730 students returned the research. 20 out of 493 data obtained was deemed to be invalid due to various reasons. As a consequence, 473 people were reached which accounts for 64.7% of the population.

Since 3rd grade students attended piano courses through at least 5 semesters, they were selected for the study population. On the other hand, 4th grade students were not included to the study because they were preparing for Public Personnel Selection Examination (PPSE) and piano courses were not taught in some departments and as a result it was thought they would not pay enough attention to the research.

Data Collection Tools

In the present study in order to identify learning styles of students 'Pamukkale Piano Learning Styles' (2017) scale have been developed by the researchers. KMO test, the significance level of the Pamukkale Piano Learning Styles scale was found to be .000. The data collected are thus acceptable for factor analysis. The KMO value of 0.684 is suitable for factor analysis. As a result of the factor analysis, four learning styles have been identified, namely, independent, analytical, dependent and affective. 25 out of 55 items were omitted and original 30 item-scale was developed. To identify the aforementioned learning styles, codes were formulated for each question and afterwards these questions were categorized according to expert-opinion based evaluation.

For measuring academic achievement of piano students 'The Achievement Test for Piano Lesson' (2017) have been developed by the researchers. It was consulted to experts and 41 questions were formulated. The reliability and validity study was administrated to music teacher candidates studying in the Music Education Department of Pamukkale University. Measuring items in terms of discrimination and difficulty, KR-20 "Kuder Richardson" test was applied. The coefficient of KR-20 was calculated as 0.71. This finding confirms the reliability of the achievement test. Subsequently, 19 questions were excluded from the study and 22 Question-Achievement Test were developed.

Table 1. The Reliability Study of Learning Style Scale

Scale	The Number of Participant = 133	The Number of Participant = 473
	The Reliability Coefficient of the Pilot Study	The Reliability Coefficient of the Original Study
Independent Learning Style Subdimension	.792	.782
Analytical Learning Style Subdimension	.792	.799
Dependent Learning Style Subdimension	.758	.759
Affective Learning Style Subdimension	.646	.737
TOTAL	.773	.832

A pilot study with 133 participants and original study with 473 participants were performed. In this respect, table 1 are shown following correlation coefficients according to the learning styles identified: .792 (pilot study), and .782 (original study) for independent learning style; .792 (pilot study) and .799 (original study) for analytical learning style; .758 (pilot study) and .759 (original study) for dependent learning style and .646 (pilot study) and .737 (original study) for affective learning style. In reference to the values emphasized by Can (2014), both implementations can be considered a very reliable instrument.

Table 2. The Frequency Distribution of the Variables in the Sample Group

Variables		Frequency	Percentage
Gender	Female	171	36.2
	Male	302	63.8
Type of High School Graduated	Fine Arts High School	356	75.3
	Other	117	24.7
The Period of Regular Piano Playing	1 – 3 years	130	27.5
	4 – 6 years	131	27.7
	7 and above	212	44.8
Private Lesson Taken	No	390	82.5
	Yes	83	17.5
The Period of Private Lesson Taken	None	390	82.5
	1 year	33	7.0
	2 years	13	2.7
	3 years	10	2.1
	4 years and above	27	5.7
The number of Piano Teachers with Whom Students Work Together through Their Course of Music Education	1 Teacher	59	12.5
	2 Teachers	90	19.0
	3 Teachers	114	24.1
	4 Teachers	108	22.8
	5 Teachers	102	21.6
TOTAL		473	100

Data Analysis

In attempt to test the data, arithmetic mean, standard deviation as well as descriptive statistics were employed. Non-parametric Kolmogorov- Smirnov test was administrated to explore whether learning styles significantly differ according to the variables of gender, type of high school graduated, the period of regular piano playing, the period of private piano lesson taken and the number of piano teachers with whom students work together through their course of music education. Also, Kruskall Wallis non-parametric test were utilized to see whether there is a significant difference between groups. Subsequently, Mann-Whitney U was used to detect significant differences between two groups. Pearson Correlation analysis was applied to measure the strength and direction of relationships between variables. Statistical packages were employed for data analysis.

Findings

This section discusses 3rd grade music teacher candidates' learning styles and their academic achievement in piano lesson and provides information on data analysis, research findings and interpretations.

The Findings and Interpretation Related to the First Subproblem

The first sub-problem of the study seeks to answer the following question: "How is the distribution of students' learning styles with respect to gender, type of high school graduated, the period of regular piano playing, private piano lesson taken, the period of private piano lesson taken and the number of piano teachers with whom students work together through their course of music education?" To investigate the first research question, frequency distributions and percentage values of the variables in the sample group were calculated.

Table 3. The Frequency Distribution of the Learning Styles According to the Variables Identified

Variables		Learning Styles								Sum Total	
		Independent		Analytical		Dependent		Affective			
		f	%	f	%	f	%	f	%	f	%
Gender	Female	30	17.5	19	11.1	28	16.4	94	55	171	36.2
	Male	59	19.5	56	18.5	13	4.3	174	57.6	302	63.8
Type of High School Graduated	Fine Arts High School	71	19.9	59	16.6	25	7.02	201	56.5	356	75.3
	Other	18	15.4	16	13.7	16	13.7	67	57.3	117	24.7
The Period of Regular Piano Playing	1 – 3 years	13	10	21	16.2	18	13.8	78	60	130	27.5
	4 – 6 years	28	21.4	19	14.5	15	11.5	69	52.7	131	27.7
	7 years and above	48	22.6	35	16.5	8	3.77	121	57.1	212	44.8
Private Piano Lesson Taken	No	71	18.2	60	15.4	34	8.72	225	57.7	390	82.5
	Yes	18	21.7	15	18.1	7	8.43	43	51.8	83	17.5
The Period of Private Piano Lesson Taken	None	71	18.2	60	15.4	34	8.72	225	57.7	390	82.5
	1 year	7	21.2	5	15.2	1	3.03	20	60.6	33	7.0
	2 years	5	38.5	2	15.4	1	7.69	5	38.5	13	2.7
	3 years	3	30	3	30	0	0	4	40	10	2.1
	4 years and above	3	11.1	5	18.5	5	18.5	14	51.9	27	5.7
The number of Piano Teachers with Whom Students Work Together through Their Course of Music Education	1 Teacher	7	11.9	10	16.9	9	15.3	33	55.9	59	12.5
	2 Teachers	14	15.6	12	13.3	9	10	55	61.1	90	19.0
	3 Teachers	26	22.8	24	21.1	10	8.77	54	47.4	114	24.1
	4 Teachers	22	20.4	18	16.7	8	7.41	60	55.6	108	22.8
	5 Teachers	20	19.6	11	10.8	5	4.9	66	64.7	102	21.6
GRAND TOTAL		89		75		41		268		473	

In terms of the gender variable, the affective learning style has the highest frequency (f=268). It is found out that the number of male students who prefer affective learning style is higher than female students. On the other hand, the dependent learning style (f=41) is the least preferred learning style and as tabulated in Table 3, the number of female students (f=28) with dependent learning style is higher than male students (f=13) with dependent learning style. As for the other two learning styles, independent (f=89) and analytical learning styles (f=75) were equally distributed.

When it comes to the variable of type of high school graduated, the most preferred learning style is affective learning styles and students who predominantly prefer affective learning style were graduated from Fine Arts High School (f=201), just as 67 students with affective learning style were graduated from other types of high school. In terms of the dependent learning style, the number of students graduated from Fine Arts High School is 25, whereas the number of students graduated from other types of high school is 16. Considering independent learning style, the number of students graduated from Fine Arts High School is 71, while 18 students with affective learning style were graduated from other types of high school. Lastly, we see that 59 students with analytical learning style were graduated from Fine Arts High School, while 16 students with analytical learning style were graduated from other types of high school.

When viewing the third variable of the research, the period of regular piano playing, results regarding students with affective learning style are as follow: 78 students (1-3 years), 69 students (4-6 years) and 121 students (7 years and above). These figures demonstrate a higher rate when compared to other learning styles. On the other hand, the distribution of independent and analytical learning styles , respectively, were detailed in Table 3 as follows: 13 students (1-3 years), 28 students (4-6 years) and 48 students (7 years and above); 21 students (1-3 years), 19 students (4-6 years) and 35 students (7 years and above).

As regards the fourth variable of the study, private piano lesson taken, the majority of the students (i.e; 225 students) with affective learning style have not taken any private lesson ever. In terms of the fifth variable of the research, the period of private piano lesson taken, the number of students who have not taken any private piano lesson can be

summarized as follow: 71 students with independent learning style, 60 students with analytical learning style, 34 students with dependent learning style and 225 students with affective learning style.

As for the distribution of the sixth variable, the number of piano teachers with whom students work together through their course of music education, 66 students with affective learning style responded that they worked with 5 teachers which is the highest number when compared to other learning styles.

On the contrary, dependent learning style is seen to have the lowest number with 5 students who said they worked with 5 teachers. 7 students with independent learning style, 10 students with analytical learning style, 9 students with dependent learning style and 33 students with affective learning style said they worked one piano teacher through their course of music education. As to the distributions of students who worked with two piano teachers, it is found out that 14 students with independent learning style, 12 students with analytical learning style, 9 students with dependent learning style and 55 students with affective learning style said they worked two piano teachers through their course of music education.

On the other hand, 26 students with independent learning style, 24 students with analytical learning style, 10 students with dependent learning style and 54 students with affective learning style said they worked three piano teachers through their course of music education. The numbers of students who worked with four piano teachers were outlined as follow: 22 students with independent learning style, 18 students with analytical learning style, 8 students with dependent learning style and 60 students with affective learning style. Lastly, it was determined that 20 students with independent learning style, 11 students with analytical learning style, 5 students with dependent learning style and 66 students with affective learning style said they worked five piano teachers through their course of music education. In light of the data obtained, we can argue that the students with affective learning style have the highest rate.

The Findings and Interpretation Related to the Second Subproblem

The second sub-problem of the study seeks to answer the following question: "Do students' learning styles differ significantly according to the variables of gender, type of high school graduated, the period of regular piano playing, private piano lesson taken, the period of private piano lesson taken, the number of piano teachers with whom students work together through their course of music education?". To answer the second research question, Kolmogorov-Smirnov (K-S) test was used to determine whether the variables were normally distributed.

Table 4. Kolmogorov-Smirnov Test Results (Normality Test)

	Gender	Type of High School Graduated	The Period of Regular Piano Playing	Private Piano Lesson Taken	The Period of Private Piano Lesson Taken	The Number of Piano Teacher with Whom Students Work Together Through Their Course of Music Education
N	473	473	473	473	473	473
Kolmogorov-Smirnov Z	8.968	10.205	6.255	10.819	10.378	3.610
Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000	.000

From the Table 4 we see that Kolmogorov-Smirnov test was conducted and the significance level of the test was found .05 according to all variables identified. Subsequently, non-parametric tests were utilized. Mann Whitney U test thus was utilized to analyze the significant difference between the two groups, while Kruskall Wallis test was conducted to examine the significant differences between more than the two groups.

Table 5. The Significance Level of the Independent Learning Styles between the Two Groups

Variables	Groups	n	Mean Rank	Sum Total	U	Z	p
Gender	Female	171	221.77	37929.00	23217.0	-1.826	.068
	Male	302	245.62	74178.00			
Type of High School Graduated	Fine Arts	356	240.48	85612.0	19586.0	-.968	.333
	High School						
	Other	117	226.40	26489.0			
Private Piano Lesson Taken	No	390	229.12	88210.50	13905.5	-2.628	.009*
	Yes	83	271.48	23890.50			

The second sub-problem of the research examines whether the variables of gender, type of high school graduated and private piano lesson taken have a meaningful effect on students with independent learning styles. As seen in Table 5, there is a significant difference in favor of those who have taken private piano lesson when compared to students who have not. We thus imply that students who have taken private piano lesson are more inclined to independent learning style than those who have not taken any private piano lesson.

Table 6. Significance Level of the Independent Learning Styles between more than the Two Groups

Variables	Groups	n	Mean Rank	sd	χ^2	p	Differentiation
The Period of Regular Piano Playing	1 – 3 years	130	209.27	2	7.476	.024*	1-2, 1-3
	4 – 6 years	131	249.99				
	7 years and above	212	245.98				
The Period of Private Piano Lesson Experience	None	390	228.45	4	11.418	.022*	1-3, 1-4,
	1 year	33	265.53				
	2 years	13	315.35				
	3 years	10	318.75				
	4 years and above	27	256.55				
The Number of Piano Teachers with whom Students Work Together through Their Course of Music Education	1 Teacher	59	210.97	4	2.991	.559	-
	2 Teachers	90	235.21				
	3 Teachers	114	239.20				
	4 Teachers	108	248.74				
	5 Teachers	102	236.54				

As regards the effects of the other three variables on students with independent learning style, significant difference was found between the period of regular piano playing (X^2 (2) = 7.476; $p<0.05$) and the period of private piano lesson taken (X^2 (4) = 11.418; $p<0.05$). To determine the differences between the groups, Mann-Whitney U test was applied and the results are given in Table 6. Each group is symbolized by a figure as follows:

With respect to the variable of the period of regular piano playing;

(1) 1 – 3 years
(2) 4 -6 years
(3) 7 years and above

With respect to the variable of the period of private piano lesson taken;

(1) None
(2) 1 year
(3) 2 years
(4) 3 years
(5) 4 years and above

"Mann Whitney U test thus was utilized to identify the significant difference between the two groups. Since *Post Hoc* process were not conducted following the Kruskal – Wallis Analysis, the Mann-Whitney U test was applied to reveal differences between the groups by selecting the groups two by two" Basturk, 2010, p.157).

Table 7. The Analysis of Differences between the Groups

	Differentiation	Groups	n	Mean Rank	Sum Total	U	Z	p
The period of Regular Piano Playing	1 - 2	1 – 3 years	130	119.58	15545.50	7030.5	-2.439	.015
		4 – 6 years	131	142.33	18645.50			
	1 - 3	1 – 3 years	130	155.18	20174.00	11659.0	-2.394	.017
		7 years and above	212	181.50	38479.00			
Private Piano Lesson Taken	1 - 3	None	390	199.14	77465.00	1610.0	-2.232	.026
		2 years	13	272.15	3538.00			
The period of Private Piano Lesson Taken	1 - 4	None	390	198.10	77062.00	1207.0	-2.053	.040
		3 years	10	273.80	2738.00			

As detailed in Table 7, there is a significant difference between the students with 1-3 years of regular playing piano and those students with 4-6 years of regular playing piano. The difference is in favor of students with 4-6 years of regular playing piano. An examination of Table 7 shows that the students with 4-6 years of regular playing piano prefer independent learning style more than students with 1-3 years of regular playing piano.

The second significant difference with respect to the variable of the period of regular piano playing is found between students with 1-3 years of regular playing piano and those with 7 years and above. When comparing the means ranks between the two groups, it is observable that students' sum of mean ranks who regularly have been playing piano for 7 years and above are higher than those with 1-3 years of regular playing piano.

Considering the period of private piano lesson taken, Table 7 indicates significant difference were found in favor of students who have taken private piano lesson for 2 years when compared to the students who have not taken any private piano lesson ever. The second significant difference detected is between the students who have not taken any private piano lesson and those who have taken private piano lesson for 3 years. When comparing the mean ranks of the two groups, students with 3 years of private piano lesson prefer independent learning style more than students who have not taken any private piano lesson.

The Findings and Interpretation Related to the Third Subproblem

The third sub-problem of the study seeks to answer the following question: "Does students' analytical learning style differs significantly according to the variables of gender, type of high school graduated, the period of regular piano playing, private piano lesson taken, the period of private piano lesson taken, the number of piano teachers with whom students work together through their course of music education?"

Table 8. The Significance Level of Analytical Learning Style between the Two Groups

Variables	Groups	n	Mean Rank	Sum Total	U	Z	p
Gender	Female	171	220.07	37632.00	22926.0	-2.031	.042*
	Male	302	246.59	74469.00			
Type of High School Graduated	Fine Arts High School	356	238.10	84764.00	20434.0	-.306	.759
	Other	117	233.65	27337.00			
Private Piano Lesson Taken	No	390	234.46	90268.50	15963.5	-.846	.398
	Yes	83	248.10	21832.50			

First, it is found that students' analytical learning style differs significantly according to the gender variable. We can thus contend that male students are more likely prefer analytical learning style than female students. Also, significant difference found is in favor of male students. On the other hand, no significant difference was detected according to the variables of type of high school graduated and private piano lesson taken.

Table 9. The Significance Level of the Analytical Learning Styles between more than the Two Groups

Variables	*Groups*	n	Mean Ranks	sd	χ^2	p	Differentiation
The Period of Regular Piano Playing	1 – 3 years	130	240.02	2	1.094	.579	-
	4 – 6 years	131	226.46				
	7 years and above	212	241.67				
The Period of Private Piano Lesson Taken	None	390	233.49	4	2.256	.689	-
	1 year	33	249.53				
	2 years	13	236.69				
	3 years	10	286.40				
	4 years and above	27	253.48				
The Number of Piano Teachers with Whom Students Work Together through Their Course of Music Education	1 Teacher	59	222.99	4	3.228	.520	-
	2 Teachers	90	219.77				
	3 Teachers	114	249.25				
	4 Teachers	108	243.50				
	5 Teachers	102	237.50				

Considering the data shown in Table 9, the variables of the period of regular piano playing, the period of private piano lesson taken and the number of piano teachers with whom students work together through their course of music education do not have any significant effect on analytical learning style.

The Findings and Interpretation Related to the Fourth Subproblem

The fourth sub-problem of the study seeks to answer the following question: "Does students' dependent learning style differs significantly according to the variables of gender, type of high school graduated, the period of regular piano playing, private piano lesson taken, the period of private piano lesson taken, the number of piano teachers with whom students work together through their course of music education?"

Table 10. The Significance Level of the Dependent Learning Styles between the Two Groups

Variables	Groups	n	Mean Ranks	Sum Total	U	Z	P
Gender	Female	171	278.48	47620.5	18727.5	- 4.973	.000*
	Male	302	213.51	64480.5			
Type of High School Graduated	Fine Arts High School	356	224.29	79848.0	16302.0	- 3.532	.000*
	Other	117	275.67	32253.0			
Private Piano Lesson Taken	No	390	234.55	90300,50	15995.5	-.818	.414
	Yes	83	247.73	21800.50			

Table 10 indicates that the gender variable has a significant effect on students' dependent learning style. It is in favor of female students. We can therefore argue that female students are more likely prefer dependent learning style than male students. Considering the variable of type of high school graduated, there is a significant difference in favor of students graduated from other high schools compared to Fine Art High School graduates. It can thus be claimed that other high school graduates are more inclined to prefer dependent learning styles when compared to students graduated from Fine Art High School. In other words, those students who have not taken any music education prefer dependent learning style more. On the other hand, the variable of private piano lesson taken does not have a significant effect on dependent learning style.

Table 11. The Significance Level of the Dependent Learning Styles between More than the Two Groups

Variables	*Groups*	n	Mean Ranks	sd	χ^2	p	Difference
The Period of Regular Piano Playing	1 – 3 years	130	269.13	2	25.894	.000*	1-2
	4 – 6 years	131	262.28				
	7 and above	212	201.67				
The Period of Private Piano Lesson Taken	None	390	235.93	4	7.125	.129	-
	1 year	33	202.24				
	2 years	13	223.65				
	3 years	10	254.65				
	4 years and above	27	292.75				
The Number of Piano Teachers With Whom Students Work Together through Their Course of Music Education	1 Teacher	59	276.96	4	8.077	.089	-
	2 Teachers	90	235.25				
	3 Teachers	114	222.85				
	4 Teachers	108	244.65				
	5 Teachers	102	220.90				

* The level of significance was taken as $p<0.05$

When it comes to the effects of other three variables on students with dependent learning style, significant difference was found according to the variable of the period of regular piano playing (X^2 (2) = 25.894; $p<0.05$). To figure out the differences between the groups, Mann-Whitney U test was performed and the results are presented in Table 12. As regards the variable of the period of regular piano playing, each group is symbolized by a figure as follows:

(4) 1 – 3 years

(5) 4 -6 years

(6) 7 years and above

Table 12. The Analysis of Differences between the Groups

	Differences	Groups	n	Mean Ranks	Sum Total	U	Z	P
The period of regular piano playing	1 - 2	1 – 3 years	130	201.44	26187.00	9888.0	-4.391	.000
		4 – 6 years	131	153.14	32466.00			

Table 12 illustrates that there is a significant difference between the students who regularly have been playing piano for 1-3 years and those students with 4-6 years of regular playing piano. The difference is in favor of students with 1-3 years of regular playing piano. According to the mean ranks tabulated in Table 12, we conclude that the students who regularly have been playing piano for 1-3 years prefer dependent learning style more than students with 4-6 years of regular playing piano. This finding puts forwards that the students who less regularly play piano are more inclined to adopt dependent learning style.

The Findings and Interpretation Related to the Fifth Subproblem

The fifth sub-problem of the study seeks to answer the following question: "Does students' affective learning style differs according to the variables of gender, type of high school graduated, the period of regular piano playing, private piano lesson taken, the period of private piano lesson taken, the number of piano teachers with whom students work together through their course of music education?"

Table 13. The Significance Level of Affective Learning Styles between the Two Groups

Variables	Groups	n	Mean Rank	Sum Total	U	Z	P
Gender	Female	171	218.68	37394.50	22688.5	- 2.203	.028*
	Male	302	247.37	74706.50			
Type of High School Graduated	Fine Arts High School	356	233.52	83131.50	19585.5	-. 971	.331
	Other	117	247.60	28969.50			
Private Piano Lesson Taken	No	390	235.96	90844.50	16539.5	-.348	.728
	Yes	83	241.55	21256.50			

*The level of significance was taken as p<0.05

Table 13 indicates students' affective learning style differs significantly according to the gender variable. Correspondingly, the significant difference is in favor of male students. We can thus contend that male students are more likely prefer affective learning style than female students. On the other hand, no significant difference was detected according to the variables of high school graduation and private piano lesson taken.

Table 14. The Significance Level of Affective Learning Styles between more than the Two Groups

Variables	*Groups*	n	Mean Ranks	sd	χ^2	p	Difference
The Period of Regular Piano Playing	1 – 3 years	130	251,00	2	1.959	.375	-
	4 – 6 years	131	234.03				
	7 and above	212	230.25				
The Period of Private Piano Lesson Taken	None	390	235.53	4	4.632	.327	-
	1 year	33	276.12				
	2 years	13	199.00				
	3 years	10	263.65				
	4 years and above	27	219.50				
The Number of Piano Teachers with Whom Students Work together through Their Course of Music Education	1 Teacher	59	225.88	4	2.580	.630	-
	2 Teachers	90	249.04				
	3 Teachers	114	223.43				
	4 Teachers	108	237.77				
	5 Teachers	102	244.85				

Considering the results shown in Table 14, we see that the variables of the period of regular piano playing, the period of private piano lesson taken and the number of piano teachers with whom students work together through their course of music education do not have a significant effect on affective learning style. In this context, these variables mentioned do not have an impact on students' affective learning styles.

The Findings and Interpretation Related to the Sixth Subproblem

The sixth sub-problem of the study seeks to answer the following question: "What kind of a relationship exists between students' learning styles and their academic achievements in piano lesson?" Data about the students' academic achievement has been collected by Achievement Test developed by researchers. To answer the sixth research question, Kolmogorov-Smirnov (K-S) test was used to determine whether the variables are normally distributed. According to K-S test, other relevant analyses were conducted.

The results of Kolmogorov-Smirnov provides that the variables were not normally distributed since p values of each variables were lower than 0.05. "If the variables are not normally distributed or the relationship between the variables is not linear, these variables will be converted into ordinal variables to be measured on "an ordinal scale" so that the correlation of these variables can be calculated via non-parametric test. This process is called "Spearman's Rank-Difference Coefficient of Correlation" (Can, 2014, p. 352). Basing on the results given in Table 15, Spearman's Rank Correlation was used to analyze the relationship between the variables.

Table 15. K - S Test Administrated to the Learning Styles (Normality Test)

	Kolmogorov - Smirnov		
	Statistic	df	Sig.
Independent Learning Style	.057	473	.001
Analytical Learning Style	.078	473	.000
Dependent Learning Style	.069	473	.000
Affective Learning Style	.136	473	.000

"The correlation coefficient of +1.00 indicates a perfect positive correlation and coefficient of -1.00 indicates a perfect negative. A correlation of .00 indicates that there is no relationship between the two variables" (Buyukozturk, 2015, p.32).

If correlation coefficient as absolute value is between 0.70-1.00, it means high; if it is between 0.70- 0.30, it means medium; if it is between 0.30-0.00, it means low level relation (Buyukozturk, 2015, p.32).

Table 16. The Relationship between Learning Styles Identified and Their Academic Achievement in Piano Lesson

		Academic Achievement in Piano Lesson
Independent Learning Styles	Spearman Correlation	.451
	Sig.(2-tailed)	.000*
Analytical Learning Styles	Spearman Correlation	.169
	Sig.(2-tailed)	.003*
Dependent Learning Styles	Spearman Correlation	.311
	Sig.(2-tailed)	.001*
Affective Learning Styles	Spearman Correlation	.422
	Sig.(2-tailed)	.001*

*Correlation is significant at the 0.01 level (2-tailed)

The analyses were carried out with respect to the last subproblem and the relationship between students' learning styles and academic achievement were examined. Then, Spearman's correlation coefficient was run to figure out the correlation between them.

First, when viewing independent learning style in the sample group, the correlation coefficient of the relationship between students with independent learning style and their academic achievement was found .451. We can thus see that medium level of relationship exists between two variables. Also, the fact that the significance level of the correlation is .01 confirms the relationship. Consequently, it was found out that the piano academic achievement of the students who prefer independent learning style positively increased.

As regards the analytical learning styles in the sample group, we see that the correlation coefficient of the relationship between students with analytical learning style and their academic achievement was found .169, providing low level of relationship between two variables. The level of the correlation was found to be .01. We can thus argue that there is a low level of relationship between students with analytical learning style and their academic achievement in piano lesson.

The correlation coefficient of the relationship between students with dependent learning style and their academic achievement was found .311, indicating medium level of relationship between two variables. The fact that the significance level of the correlation was found to be .01 highlights that students with dependent learning style showed higher academic achievement in piano lesson.

In terms of the affective learning style, the correlation coefficient of the relationship between students with affective learning style and their academic achievement was found .422, providing medium level of relationship between two variables. The fact that the significance level of the correlation was found to be .01 highlights that students with affective learning style demonstrated higher academic achievement in piano lesson. Lastly, it was found that there is no high level of relationship between all learning styles and piano academic achievements. In addition to it, "Independent Learning Style" has the highest level amongst all learning styles with the value of .451. We can therefore imply that students who prefer independent learning style are likely to have a higher academic achievement in piano lesson.

Discussion and Recommendation

Upon conducting analyses and researches, a learning style model was created to explore learning styles of students in piano lesson. Subsequently, four learning styles were developed, namely, "independent, analytical, dependent and affective". Pamukkale Piano Learning Style focuses on the question of what kind of learning styles music teacher candidates possess. It was thus attempted to develop "Pamukkale Piano Learning Style Scale" and four types of learning styles was identified. These styles are independent, analytical, dependent and affective learners.

The article written by Bas and Beyhan (2013) titled "Effects of Learning Styles Based Instruction on Academic Achievement" investigates the effects of learning styles based instruction on students' academic achievement, attitudes towards course and the retention levels of their achieved knowledge in the English course. The results of the research showed learning styles based instruction had positive effects on students' academic achievement, attitudes towards course and the retention levels of their achieved knowledge. In the same vein, in Sural's study (2008) titled "The Relationship Between Learning Styles And Academic Achievements Of Primary Candidate Teachers In Science And Technology Teaching Lesson", it is concluded that there is a negative relationship between learning styles of students with dependent and competitive learning styles and their academic achievements.

As for the research findings, no high level of relationship between all learning styles and their academic achievements was observed. Besides that, independent learning style is seen to have the highest relationship. This finding implies that students who prefer independent learning style are more likely to show higher academic achievement in piano lesson.

In the article titled "Examination of the Relationship between Teacher Candidates' Learning Styles and Their Study Habits" Ahmet Kaya, Bozaslan, Durdukoca (2012) highlight that there is no significant relationship between teacher candidates' learning styles and their gender, department, academic achievement and study habits.

On the other hand, Demir's (2008) case study titled "Learning Styles of the Turkish Teaching Students" aimed to identify the learning styles of Turkish teachers and the relationship between these learning styles and their genders and the high school they graduated from. In conclusion, no significant relationship was found between the learning styles of these students and their gender and high school education. However, it was detected that there was a meaningful relationship between the high school they graduated from and their learning styles. In studying Torres's work, the academic performance of the students was measured using the general grade averages they received. A total of 229 Latin students enrolled in a New York City high school participated in the study. The Learning Style Inventory developed by Kolb and Dunn, Dunn and Price (2003) Learning Style Inventory were used to describe learning styles of students. The results of the Tores learning style inventory indicated that there was no relationship between students' learning styles and grade average.

If instruction methods are well-formed, individuals or students can experience a more effective learning. Given that constructivist learning approach pays more attention to learner individual differences, the purpose of study was to develop a learning style model in piano education in line with the learning styles specified by education studies. In the present research, piano learning style scale was developed to investigate the question of what kind of learning style students possess. An achievement test for piano lesson was also developed to compare students' learning styles with their performance in piano lesson. The research question was formulated to explore students' piano learning styles using the scale and to compare these learning styles with their academic achievements. It is believed that the present study will highly contribute the piano education, a subdimension of music education. As a result of the research, following recommendations are presented:

This section provides information on the research findings and some practical recommendations for researches.

• It is suggested to explore learning styles of students enrolled in Music Education Departments and to design piano teaching curriculum according to students' learning styles for future researches.

• It is recommended to identify the learning styles of "at least high school graduate students" attending private music schools' piano lessons and correspondingly to arrange piano education.

• The predominant learning styles of students studying at Music Education Departments, Fine Arts High School and State Conservatory and Private Music Schools can be measured each year to see if there is any change in their learning styles.

• Faculty members teaching at Music Education Departments can be encouraged to apply piano learning style scale before their first lesson and to follow a curriculum that incorporates students' learning styles.

• In private music schools, piano instructors teaching "at least high school graduate students" can be encouraged to apply piano learning style scale before their first lesson and to follow a curriculum that incorporates students' learning styles.

It is recommended to carry out further researches using different variables.

• A qualitative study can be administrated to students who have different kinds of learning styles so that more detailed data can be obtained.

• This study can be applied to Fine Arts High Schools by utilizing same variables.

• Applying piano achievement test at the end of each semester, the relationship between the groups whose learning styles are previously determined can be investigated.

• In parallel with the curriculum, a qualitative study can be implemented including students who have each one of the aforementioned learning styles in the present study in order to measure the relationship between their learning styles and academic achievements in piano lesson.

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